In the Claims:

Claims 1-16 were examined.

Amend claims 1, 3, 11, 14 and 16 as follows:

1. (currently amended) A method of measuring machine alignment offset of an optical machine having an alignment system, the machine used to form overlayed images of first and second patterns formed on a first or first and second reticles onto a substrate at respective first and second levels, the method comprising the steps of:

a) creating one or more virtual zero-offset alignment patterns and one or more virtual zero-offset metrology patterns;

b) imaging with the optical machine, using first and second exposures, first and second metrology patterns on the substrate at the first and second levels, respectively, in an overlayed manner, by aligning the second exposure to the first exposure using the zero-offset alignment patterns, said first and second metrology patterns based on the virtual zero-offset metrology patterns of said step a);

c) obtaining an image of the overlayed first and second metrology patterns formed on the substrate using the alignment system of the optical machine; and

d) comparing the virtual zero-offset metrology pattern to corresponding portions of the image obtained in said step [[~~d~~)]] c) to deduce an offset from an ideal alignment of the first and second metrology patterns.

2. (original) A method according to claim 1, wherein said step a) includes the step of forming the virtual zero-offset alignment pattern by combining one or more shape primitives from a set of shape primitives.

3. (currently amended) A method according to claim 2, wherein said

step a) further includes the steps of:

i) generating a bit-map image of the zero-offset alignment pattern;

ii) creating a simulated optical image of the bit-map image; and

iii) saving the simulated optical image as the virtual zero-offset alignment pattern in memory.

4. (original) A method according to claim 3, wherein said step d) includes performing said comparing step using pattern recognition software.

5. (original) A method according to claim 4, wherein said step b) includes forming the first metrology pattern by replicating the zero-offset metrology pattern at the four corners of an imaginary square having a geometric center.

6. (original) A method according to claim 5, wherein said step b) includes imaging the first and second metrology patterns such that the second metrology pattern imaged is as close as possible to the geometric center of the imaginary square.

7. (original) A method according to claim 1 for performing alignment for a plurality of jobs to be performed, further including the step of creating zero-offset alignment patterns for each job.

8. (original) An alignment system, capable of measuring a machine offset, as part of an optical machine having a machine optical system used to form overlayed images of first and second patterns formed on first and second reticles onto a substrate at respective first and second levels, the alignment system comprising:

a light source;

an alignment optical system arranged adjacent the light source and designed such that light from the light source is directed to illuminate a portion of the substrate and pass back through at least a portion of the alignment optical system;

a detector capable of detecting images of first and second alignment patterns formed on the substrate at respective first and second levels and illuminated by said light source; and

a computer system having pattern recognition software stored therein and a memory unit containing one or more virtual zero-offset patterns accessible to said pattern recognition software, at least one of said one or more zero-offset patterns corresponding to the first and second metrology patterns; and at least one of said one or more zero-offset patterns corresponding to the first and second alignment patterns;

wherein said computer system is capable of comparing images of the first and second alignment patterns detected by the alignment optical system to at least one of the one or more virtual zero-offset patterns when the first and second alignment patterns are formed on the substrate in an overlayed manner, so as to determine an amount of offset between the first and second alignment patterns relative to an ideal overlay of the first and second patterns.

9. (original) A system according to claim 8, wherein said alignment optical system includes the machine optical system.

10. (original) A method of processing wafers in the manufacturing semiconductor devices using a set of two or more machines in a manner that is independent of the job, the method comprising the steps of:

a) measuring a machine alignment offset for each machine in the set of machines according to the method of claim 1;

b) storing the measured machine offsets in the corresponding machines; and

c) processing wafers on any machine in the set of machines without measuring an offset for any machine in the set of machines that depends on the job.

11. (currently amended) A computerized method for measuring the

machine offset of a lithographic optical system, the method comprising the steps of:

a) forming a virtual alignment pattern from a database of primitive shapes and storing the virtual alignment pattern in a memory unit;

b) comparing first and second images of actual alignment patterns based on said virtual alignment pattern formed on first and second levels of a substrate to said virtual alignment pattern; and

c) computing an offset between the first and second images of the actual alignment patterns.

12. (original) A method according to claim 11, wherein said step a) includes the steps of:

i) generating a bit-map image of a zero-offset alignment pattern; and

ii) creating a simulated optical image of the bit-map image.

13. (original) A method according to claim 11, wherein said comparison of said step b) includes the step of performing pattern recognition.

14. (currently amended) A computer-readable medium having computer-executable instructions for performing a method of characterizing a machine alignment offset of an optical machine, the method comprising the steps of:

a) forming a virtual alignment pattern from a database of primitive shapes and storing the virtual alignment pattern in a memory unit;

b) comparing first and second images of actual alignment patterns based on said virtual alignment pattern formed on first and second levels of a substrate to said virtual alignment pattern; and

c) computing an offset between the first and second images of the alignment patterns.

15. (original) A computer-readable medium according to claim 14, wherein

the computer-executable instructions further includes the steps, as part of said step a), of:

i) generating a bit-map image of a zero-offset alignment pattern; and

ii creating a simulated optical image of the bit-map image.

16. (currently amended) A computerized method of measuring machine overlay offset of an optical machine having an alignment system, the machine used to form overlayed images of first and second patterns formed on first and second reticles onto a substrate at respective first and second levels, the method comprising the steps of:

a) forming a virtual zero-offset alignment pattern;

b) imaging with the optical machine, using first and second exposures, first and second metrology patterns on the substrate at the first and second levels, respectively, in an overlayed manner, said first and second metrology patterns based on the virtual zero-offset metrology pattern of said step a);

c) obtaining an image of the overlayed first and second patterns formed on the substrate using the alignment system of the optical machine; and

d) comparing the virtual zero-offset metrology pattern to corresponding portions of the image obtained in said step [[~~d~~)]] c) to deduce an offset from an ideal overlay of the first and second metrology patterns.